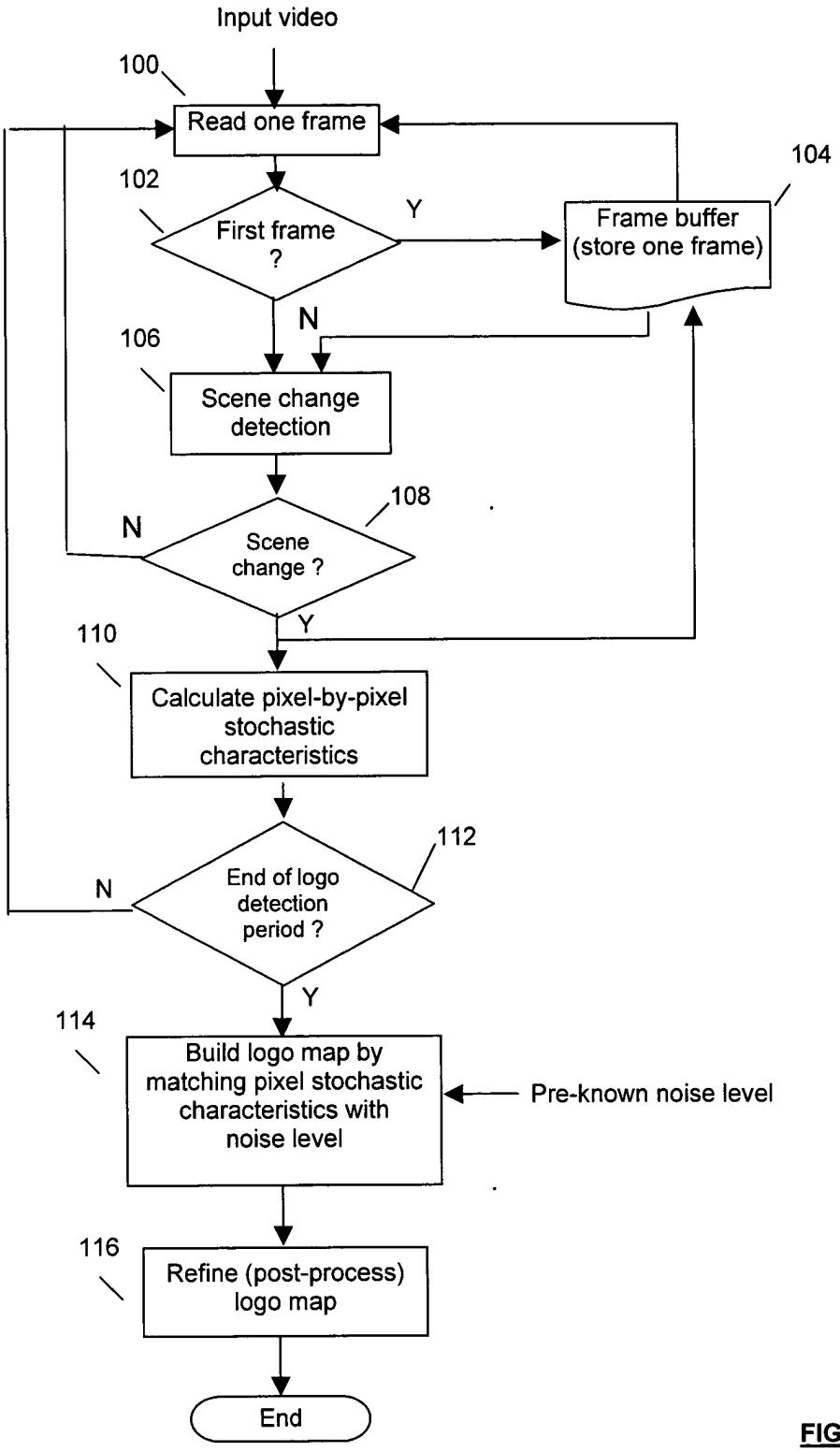
Input video
100
Read one frame
102
First frame ?
Y
104
Frame buffer (store one frame)
N
106
Scene change detection
108
N
Scene change ?
Y
110
Calculate pixel-by-pixel stochastic characteristics
112
N
End of logo detection period ?
Y
114
Build logo map by matching pixel stochastic characteristics with noise level
Pre-known noise level
116
Refine (post-process) logo map
End

FIG. 1

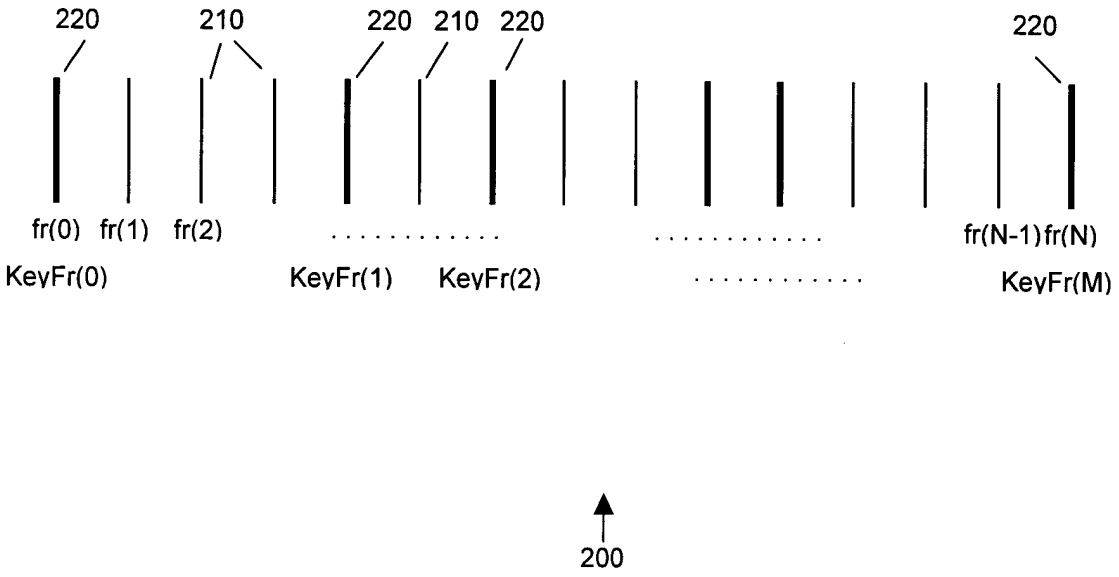
220
210
220
210
220
220
fr(0)
fr(1)
fr(2)
fr(N-1)
fr(N)
KeyFr(0)
KeyFr(1)
KeyFr(2)
KeyFr(M)
200

FIG. 2

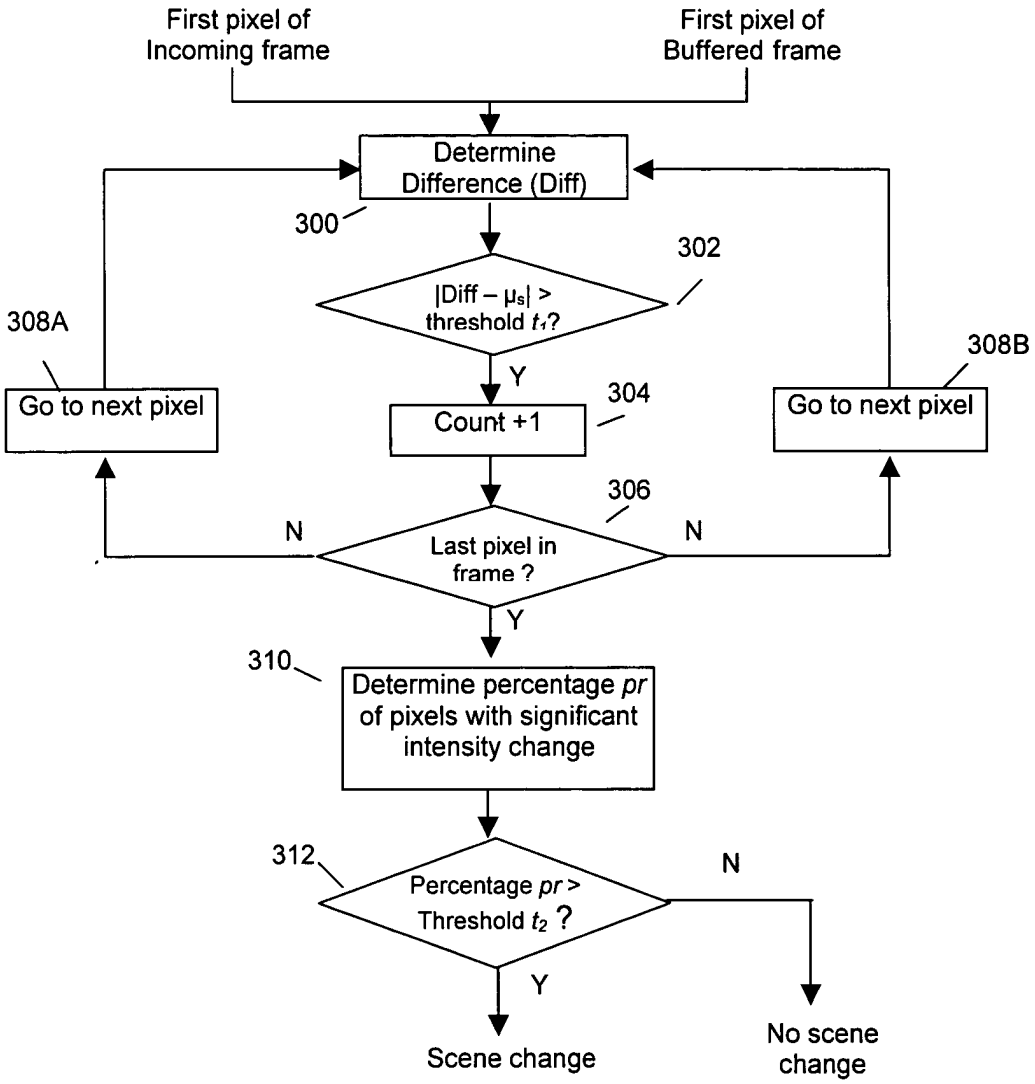
First pixel of Incoming frame
First pixel of Buffered frame
Determine Difference (Diff)
300
302
|Diff – μs| > threshold t1?
308A
308B
Y
Go to next pixel
304
Count +1
Go to next pixel
306
N
N
Last pixel in frame ?
Y
310
Determine percentage pr of pixels with significant intensity change
312
N
Percentage pr > Threshold t2 ?
Y
Scene change
No scene change

FIG. 3

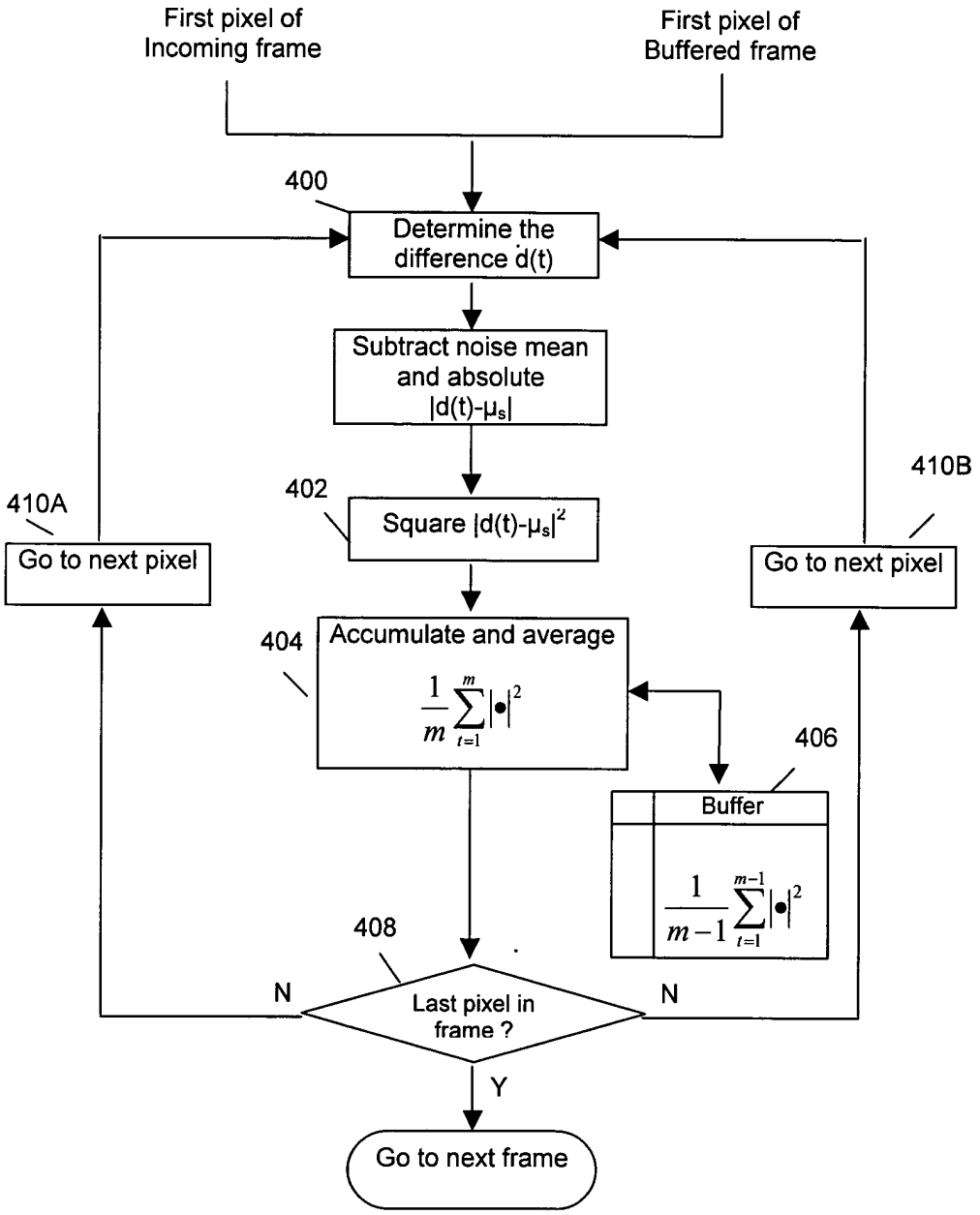
First pixel of Incoming frame
First pixel of Buffered frame
400
Determine the difference d(t)
Subtract noise mean and absolute |d(t)-μs|
402
Square |d(t)-μs|2
404
Accumulate and average
$\frac{1}{m}\sum_{t=1}^{m}|\bullet|^2$
406
Buffer
$\frac{1}{m-1}\sum_{t=1}^{m-1}|\bullet|^2$
410A
Go to next pixel
410B
Go to next pixel
408
Last pixel in frame ?
N
N
Y
Go to next frame

FIG. 4

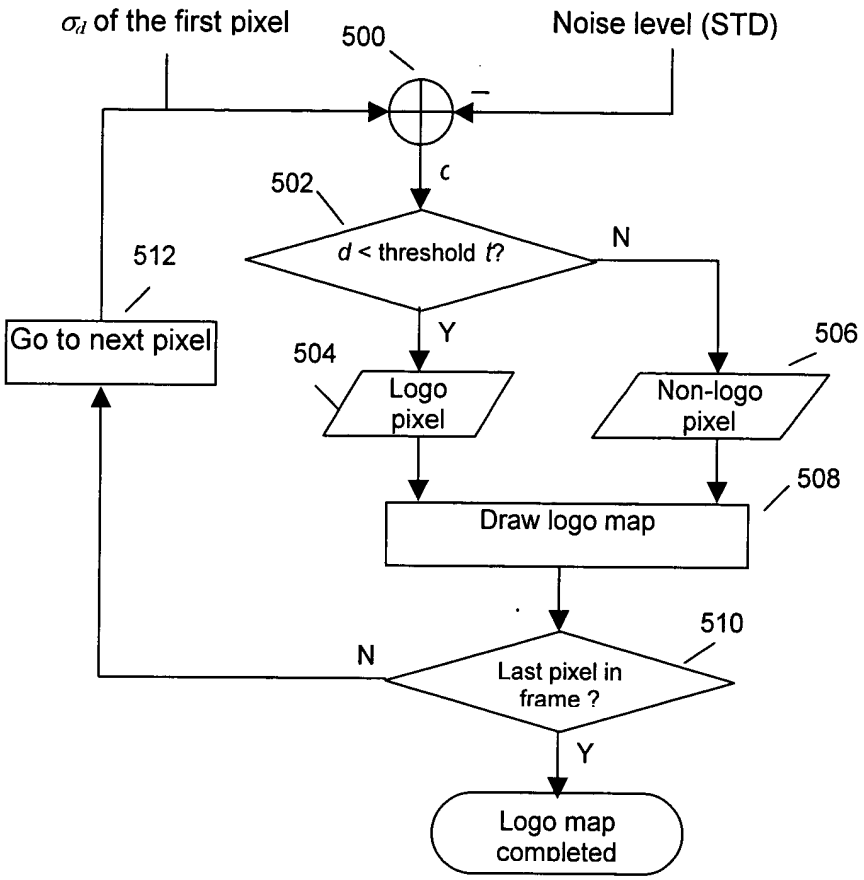
σ_d of the first pixel
500
Noise level (STD)
−
c
502
d < threshold t?
N
512
Y
Go to next pixel
504
506
Logo pixel
Non-logo pixel
508
Draw logo map
510
N
Last pixel in frame ?
Y
Logo map completed

FIG. 5

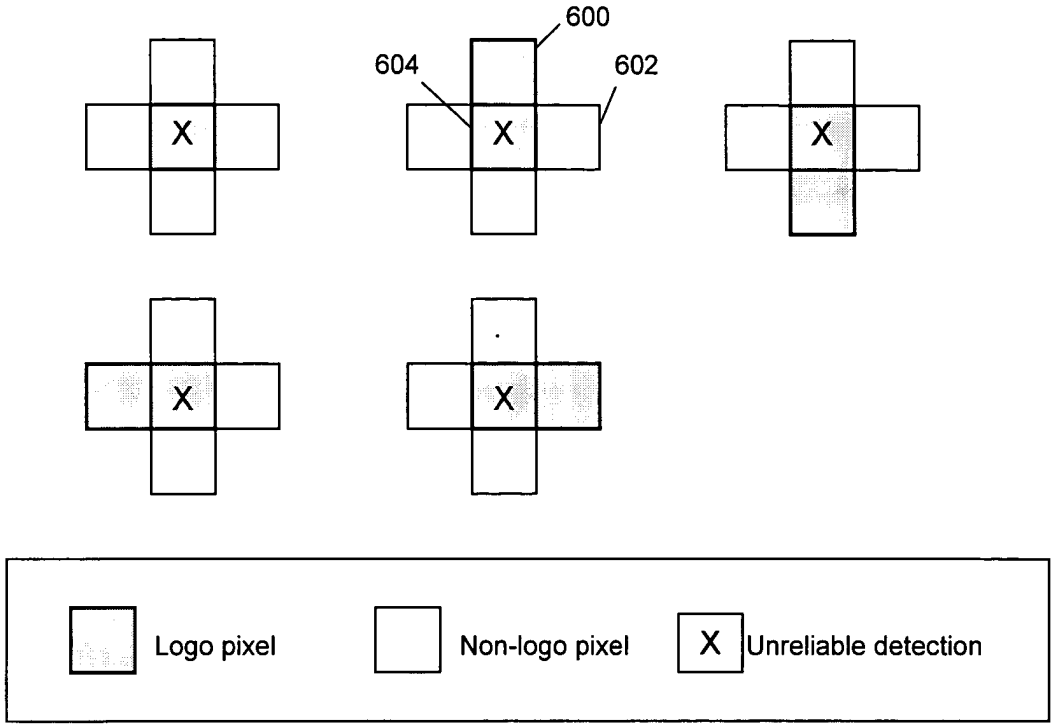
600
604
602
X
X
X
X
X
Logo pixel
Non-logo pixel
X
Unreliable detection

FIG. 6A

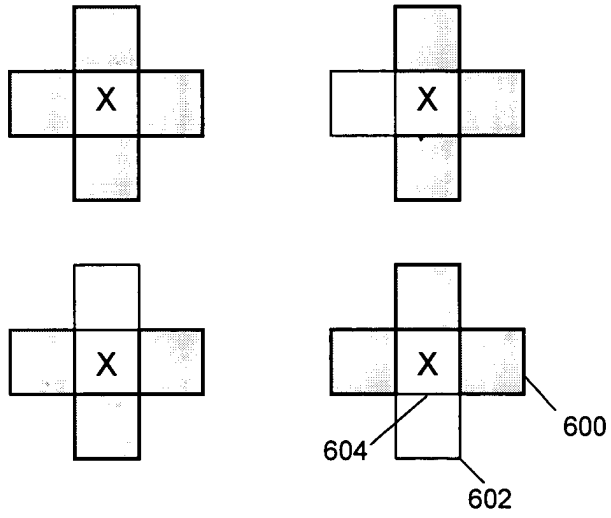
X
X
X
X
X
600
604
602

FIG. 6B

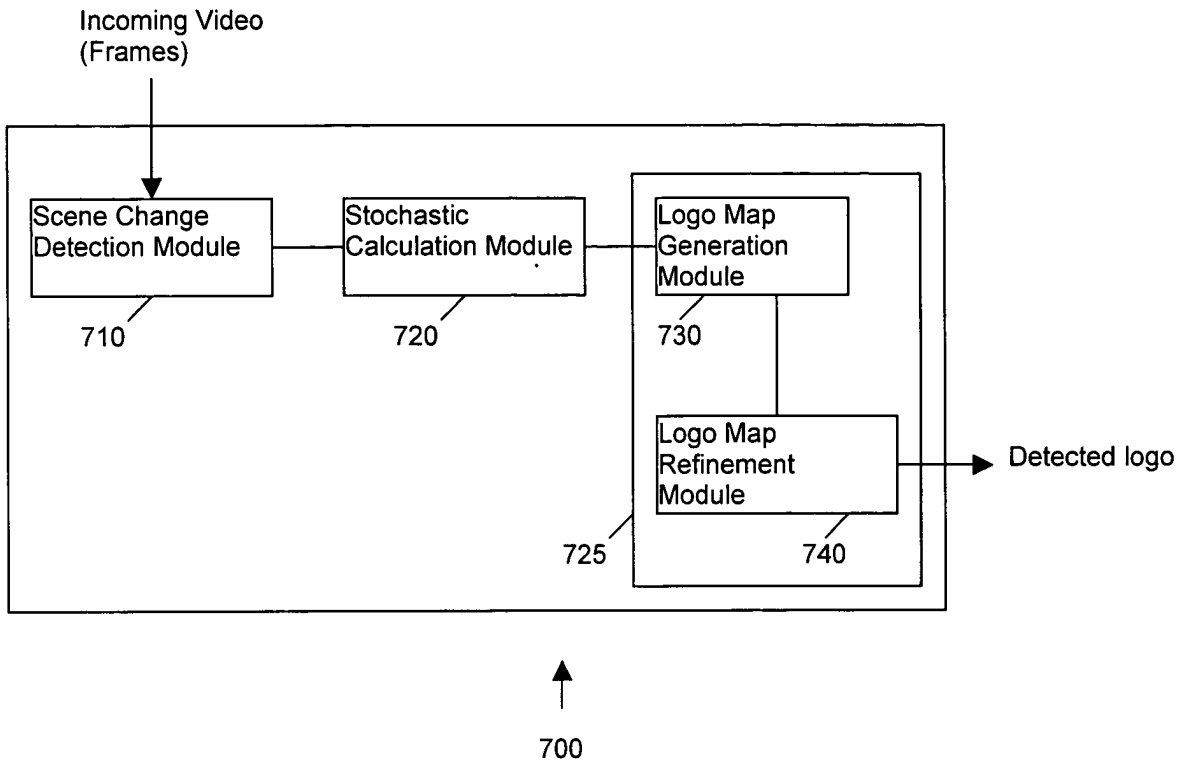
Incoming Video
(Frames)
Scene Change
Detection Module
Stochastic
Calculation Module
Logo Map
Generation
Module
Logo Map
Refinement
Module
Detected logo
710
720
730
725
740
700

FIG. 7

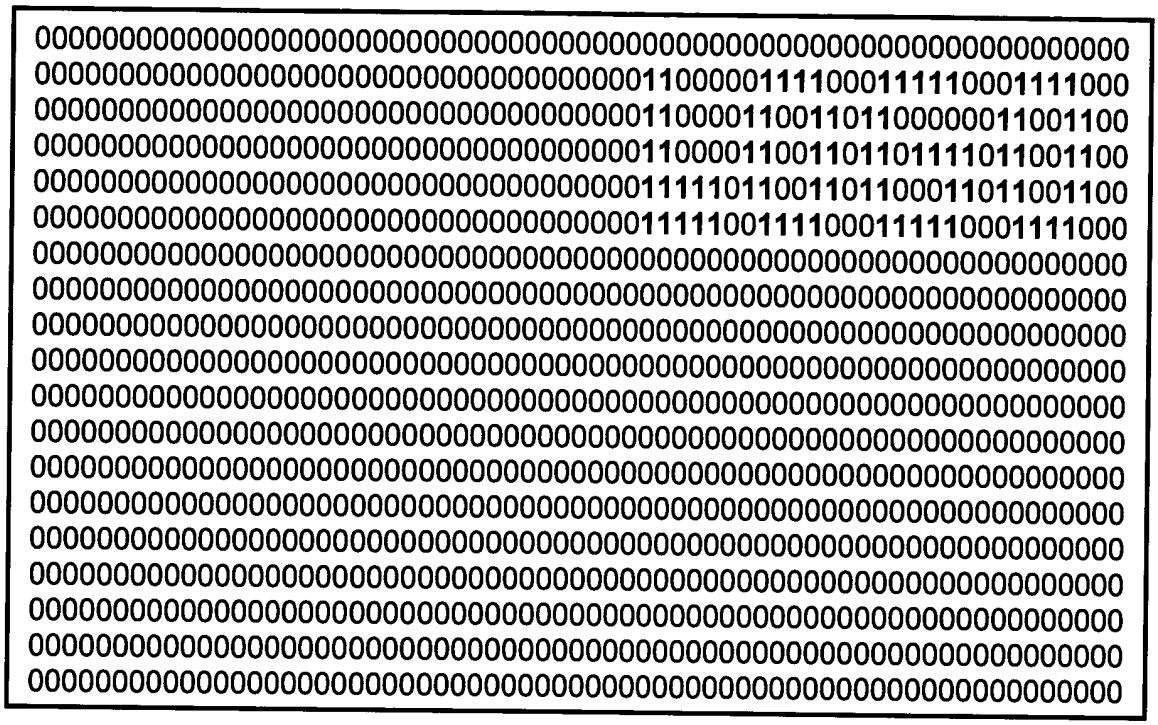

FIG. 8